# Draft
# Demand and Supply Assessment
## Tucson Active Management Area
June 14, 2010  GUAC

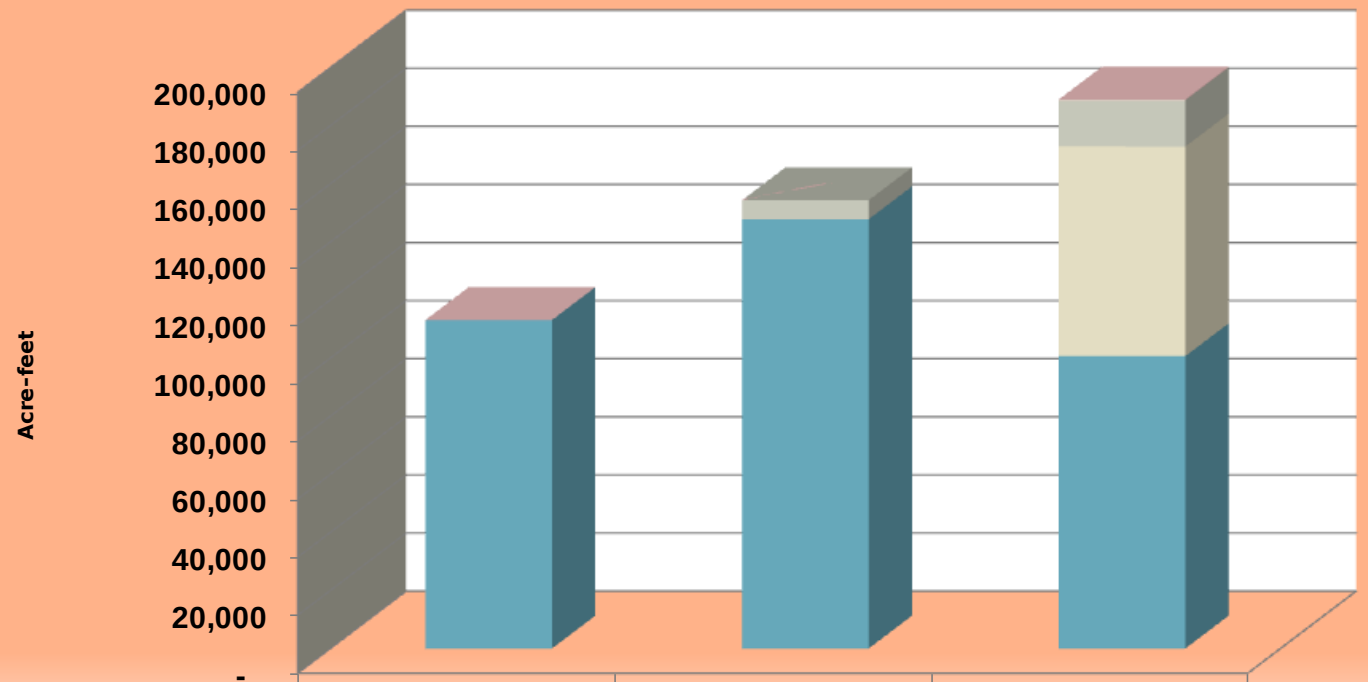
# Purpose of the TAMA Assessment

- Compilation and study of historical water demand and supply for TAMA (1985-2006)
- Calculates seven water supply and demand projection scenarios to the year 2025
- Calculates whether TAMA will likely reach Safe-Yield by 2025 – multiple scenarios
- Lays the groundwork for the Fourth Management Plan

# Historical Water Use

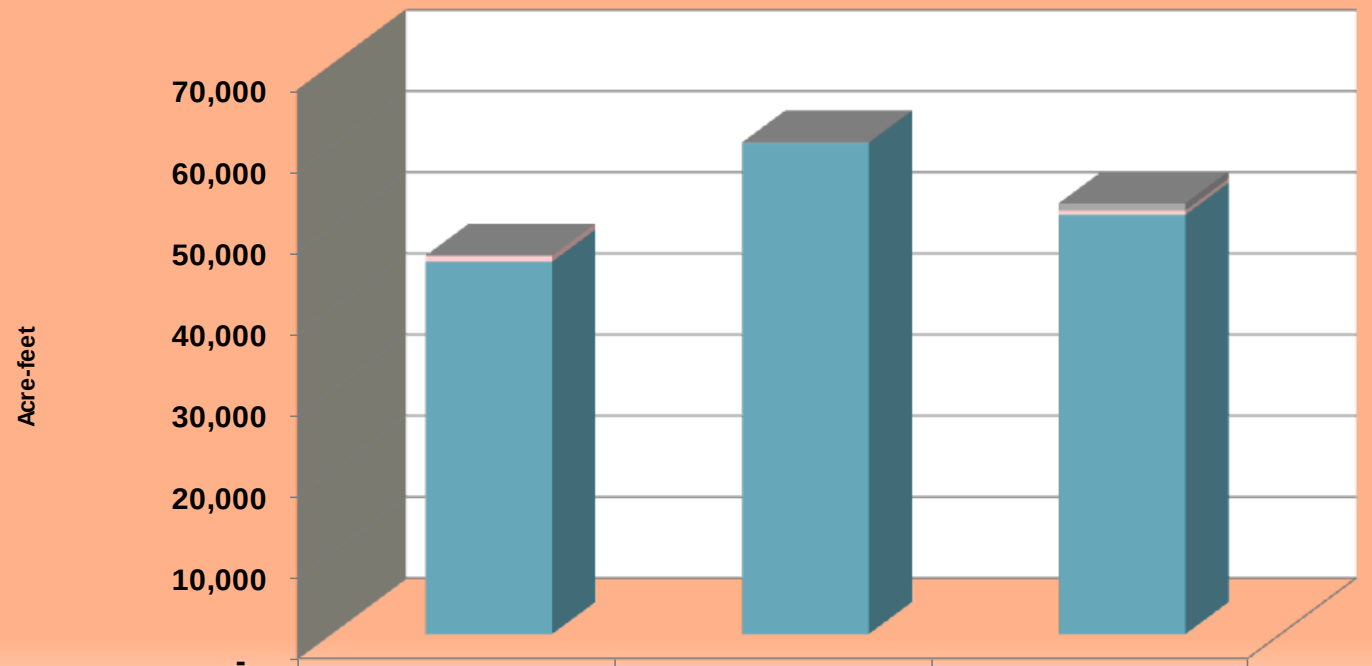
- Data was compiled from Annual Water Withdrawal and Use Reports
- Effort was made to be consistent across AMAs
- Historic Period is 1985-2006
  - Longest period of consistent data (21 yrs)

# Historical Municipal Demand and Supply



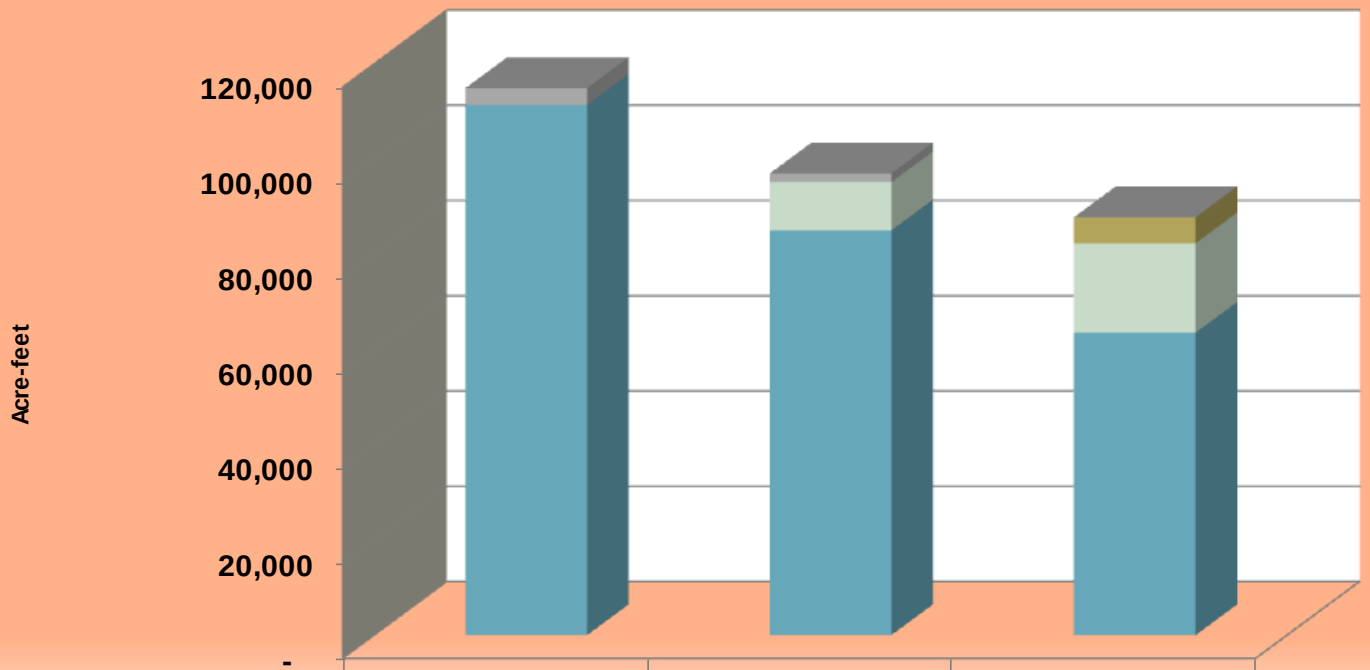

| | 1985 | 1995 | 2006 |
|---|---|---|---|
| TOTAL | 113,080 | 154,288 | 188,967 |
| Surface Water | - | - | 210 |
| Reclaimed Water | - | 6,525 | 15,947 |
| CAP | - | - | 72,179 |
| Groundwater | 113,080 | 147,763 | 100,631 |

# Historical Industrial Demand and Supply



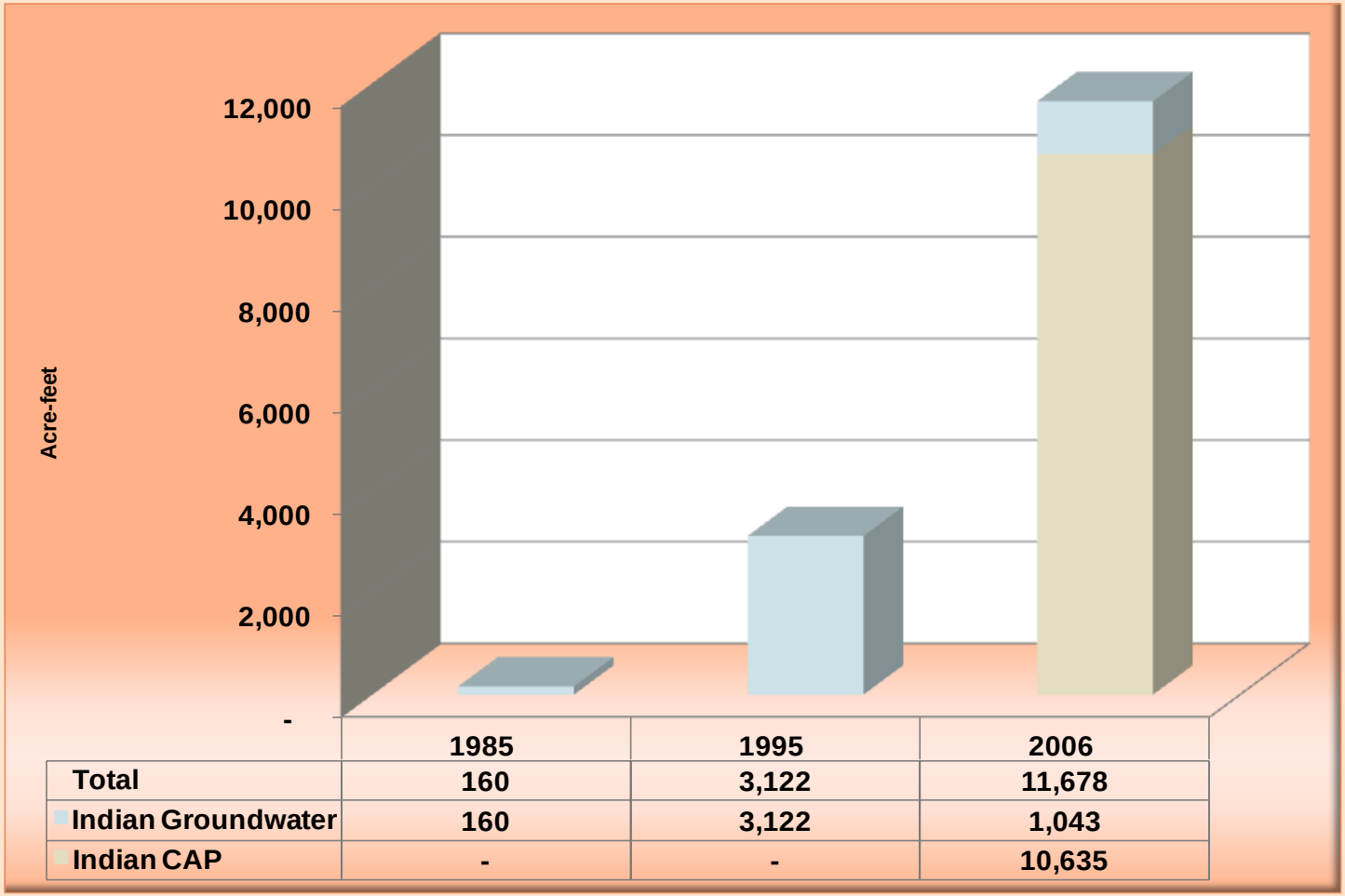

| | 1985 | 1995 | 2006 |
|---|---|---|---|
| TOTAL | 46,616 | 60,589 | 53,084 |
| Reclaimed Water | - | 89 | 883 |
| Surface Water | 720 | - | 400 |
| CAP | - | - | 135 |
| Groundwater | 45,896 | 60,500 | 51,665 |

# Historical Agricultural Demand and Supply




| | 1985 | 1995 | 2006 |
|---|---|---|---|
| TOTAL | 114,879 | 96,943 | 87,755 |
| Reclaimed Water | 3,546 | 1,801 | - |
| CAP | - | - | 5,450 |
| In-Lieu Groundwater | - | 10,137 | 18,794 |
| Groundwater | 111,333 | 85,005 | 63,511 |

# Historical Indian Demand and Supply




| | 1985 | 1995 | 2006 |
|---|---|---|---|
| Total | 160 | 3,122 | 11,678 |
| Indian Groundwater | 160 | 3,122 | 1,043 |
| Indian CAP | - | - | 10,635 |

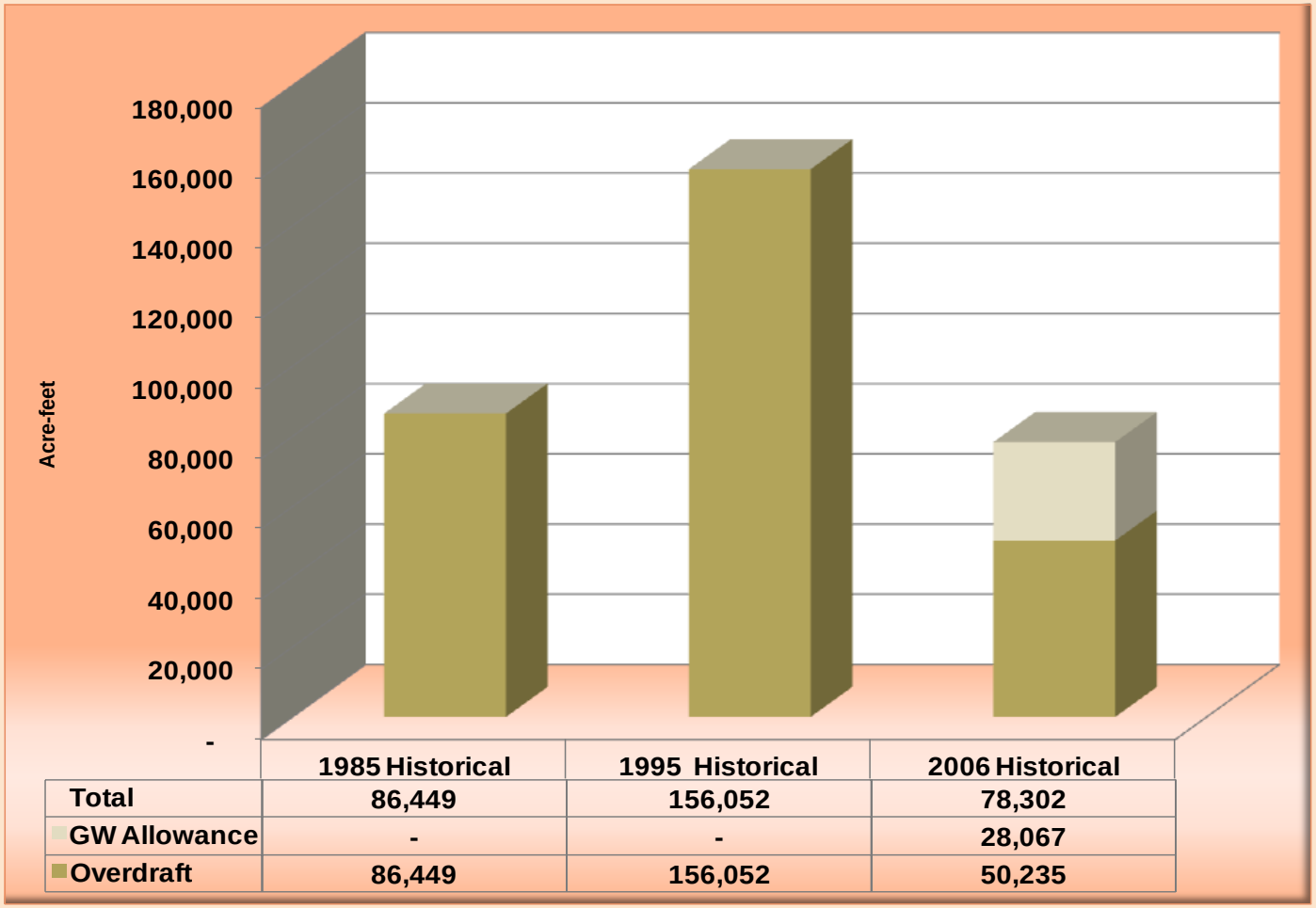
# Water Stored at Recharge Facilities 1995, 2000, 2006

| Recharge Facilities | 1995 | 2000 | 2006 |
|---|---|---|---|
| Groundwater Savings Facilities | | | |
| *Number of Facilities* | 2 | 5 | 6 |
| *CAP Stored* | 10,137 | 27,973 | 18,794 |
| Underground Storage Facilities (Constructed) | | | |
| *Number of Facilities* | 3 | 4 | 10 |
| *CAP Stored* | 0 | 45,354 | 128,143 |
| *Surface Water* | 0 | 0 | 149 |
| *Reclaimed Water Stored* | 2,601 | 6,286 | 10,508 |
| Underground Storage Facilities (Managed) | | | |
| *Number of Facilities* | 0 | 1 | 2 |
| *Reclaimed Water Stored* | 0 | 6,475 | 24,577 |
| **Total Stored** | **12,738** | **84,088** | **182,172** |

# Estimate of Overdraft

| Inputs | Withdrawals |
|---|---|
| **Sector Incidental Recharge** | **Sector Pumpage** |
| ***Municipal*** | ***Municipal*** |
| ***Industrial*** | ***Industrial*** |
| ***Agriculture*** | ***Agriculture*** |
| ***Indian Agriculture*** | ***Indian Agriculture, Municipal and Industrial*** |
| **Canal Seepage** | **Riparian Demand** |
| **Net Natural Recharge** | |
| **Riparian Use of Managed Reclaimed Water** | |
| **Reclaimed Water Discharge** | |
| **CAGRD Replenishment** | |
| **Artificial Recharge Cut to the Aquifer** | |

# Historical Overdraft

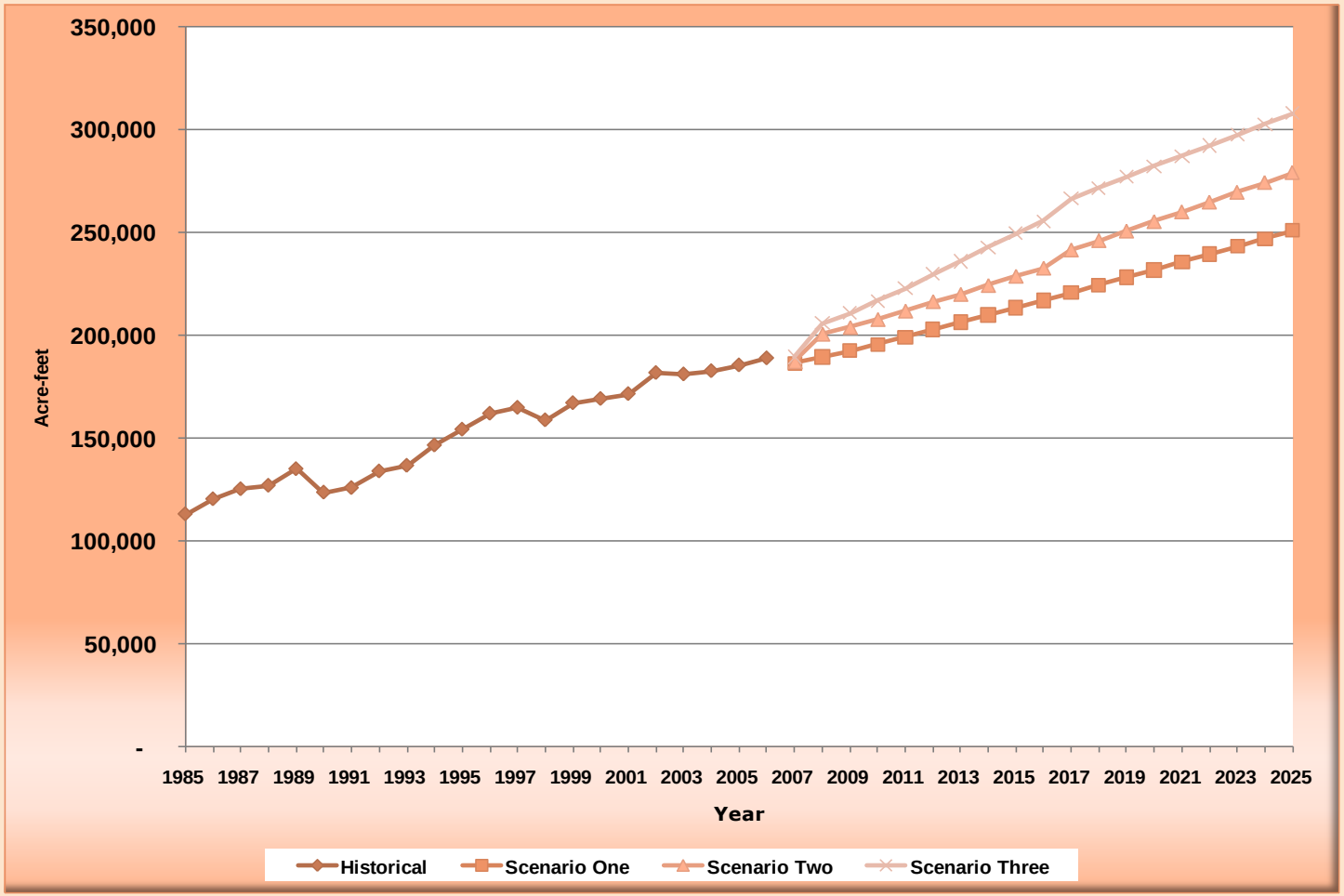



| | 1985 Historical | 1995 Historical | 2006 Historical |
|---|---|---|---|
| Total | 86,449 | 156,052 | 78,302 |
| GW Allowance | - | - | 28,067 |
| Overdraft | 86,449 | 156,052 | 50,235 |

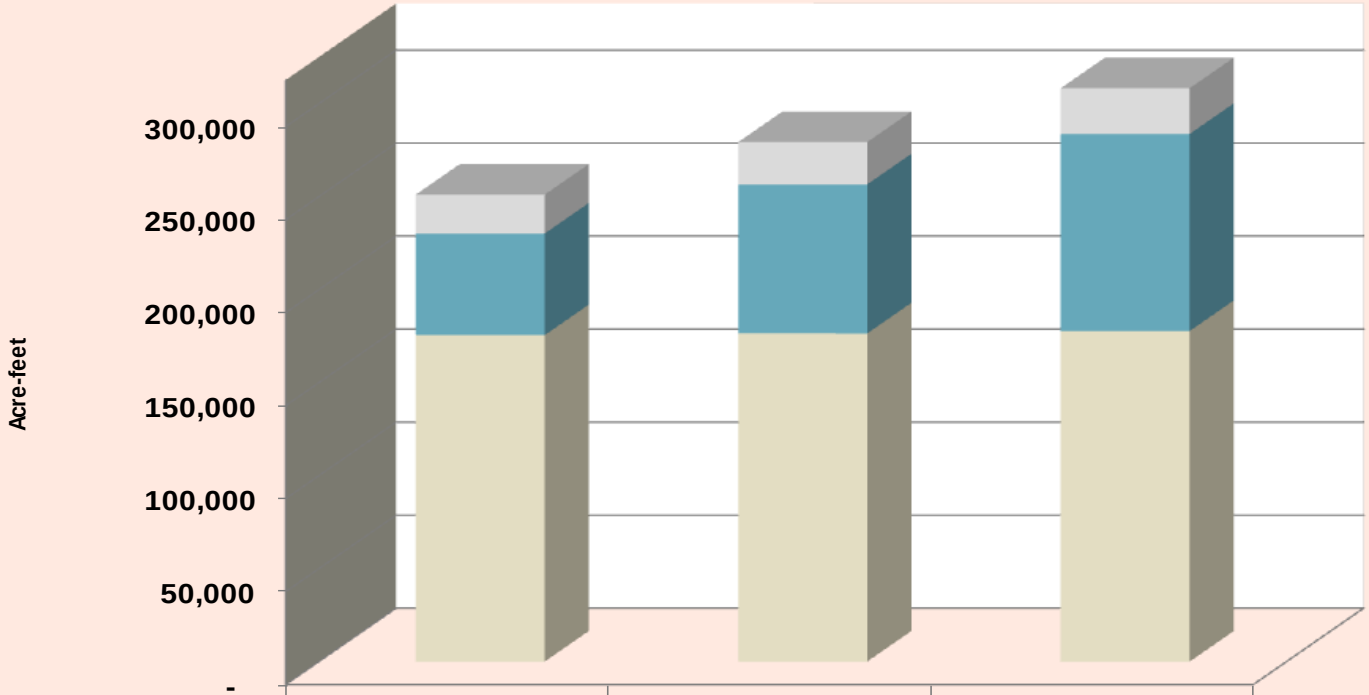
# Projection Methodology

- Municipal
  - Population based on PAG projections, DAWS applications, annual reports
  - Projected demands based on GPCD rates, DAWS projected demands
- Industrial
  - Trend line Analysis
  - AMA Staff or Sector Professional Best Judgment
  - Average Historical Use or Current Use held constant
- Agriculture
  - Trend line and Regression Analysis
  - AMA Staff or Sector Professional Best Judgment
  - Average Historical Use or Current Use

# Projected Municipal Demand

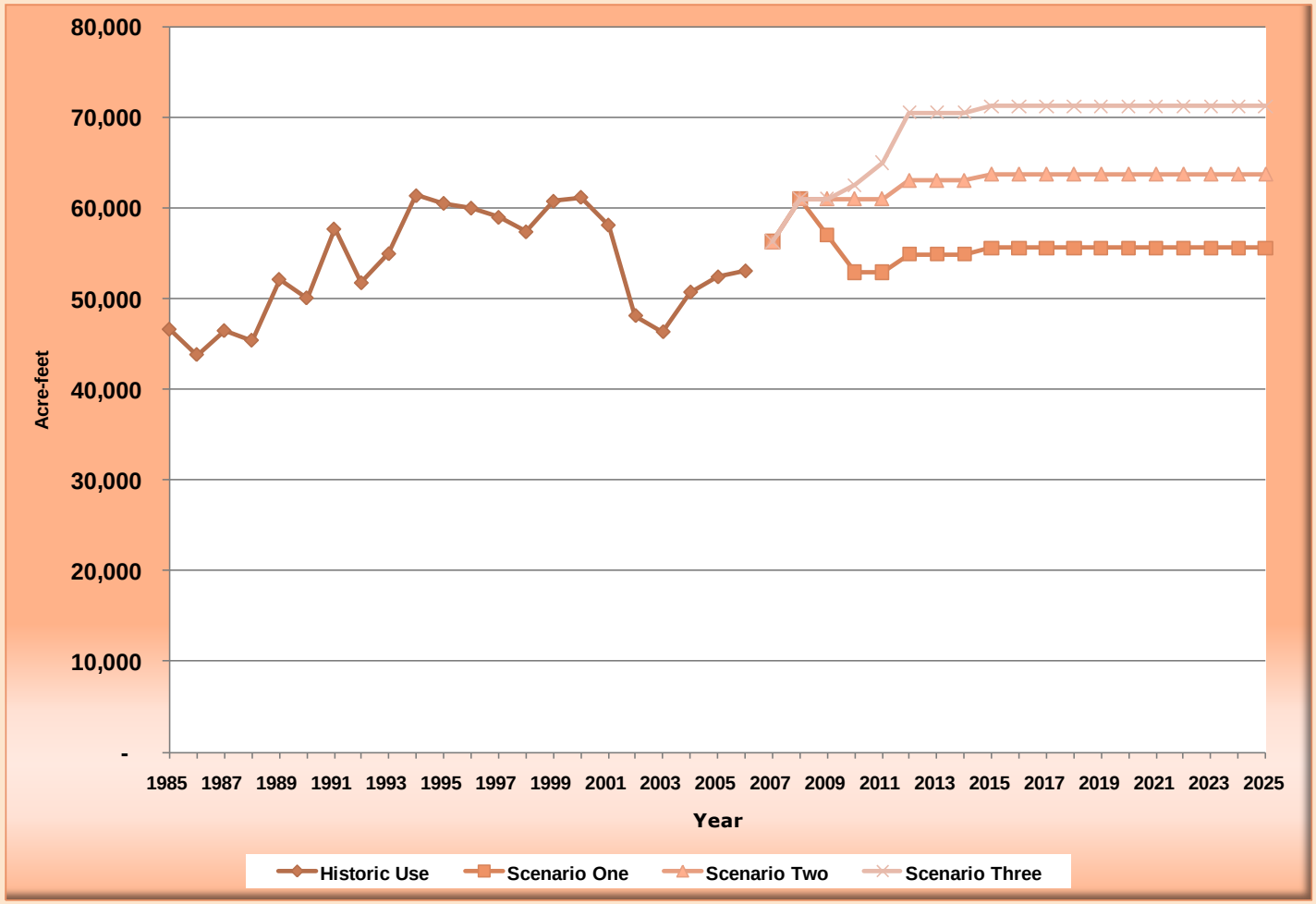


# Projected Municipal Supply

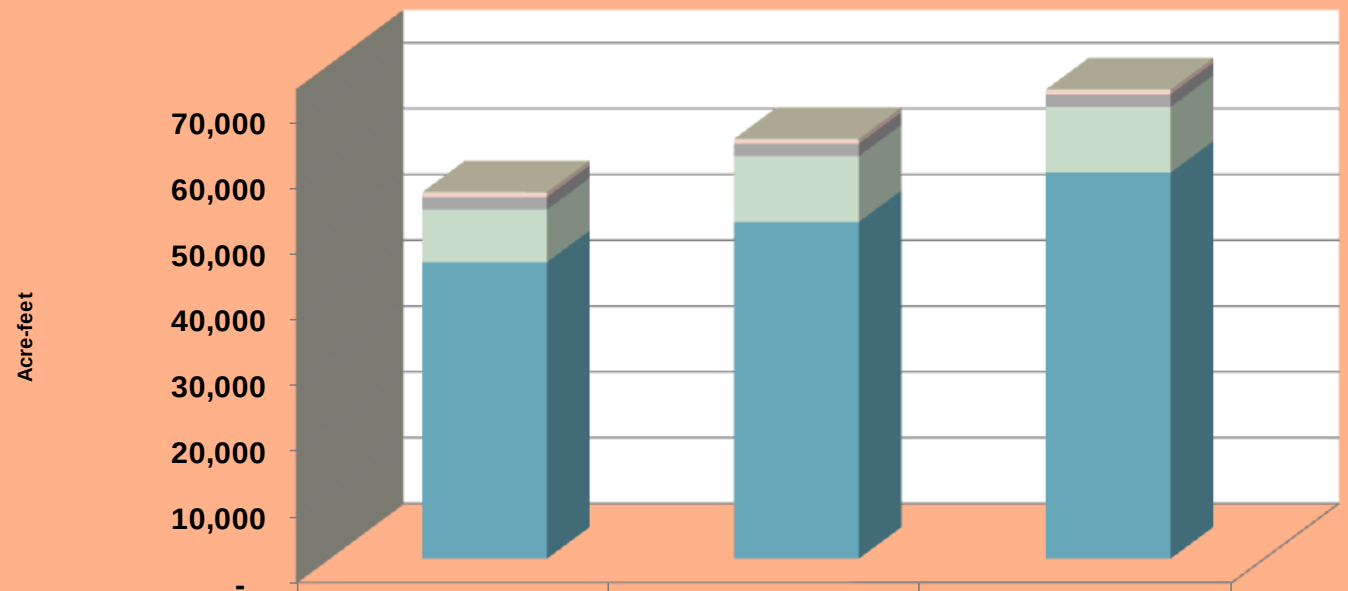



| | 2025 Scenario One | 2025 Scenario Two | 2025 Scenario Three |
|---|---|---|---|
| TOTAL | 251,018 | 279,264 | 308,237 |
| Reclaimed Water | 20,902 | 22,724 | 24,554 |
| Groundwater | 54,627 | 80,119 | 105,962 |
| CAP | 175,488 | 176,421 | 177,721 |

# Projected Industrial Demand

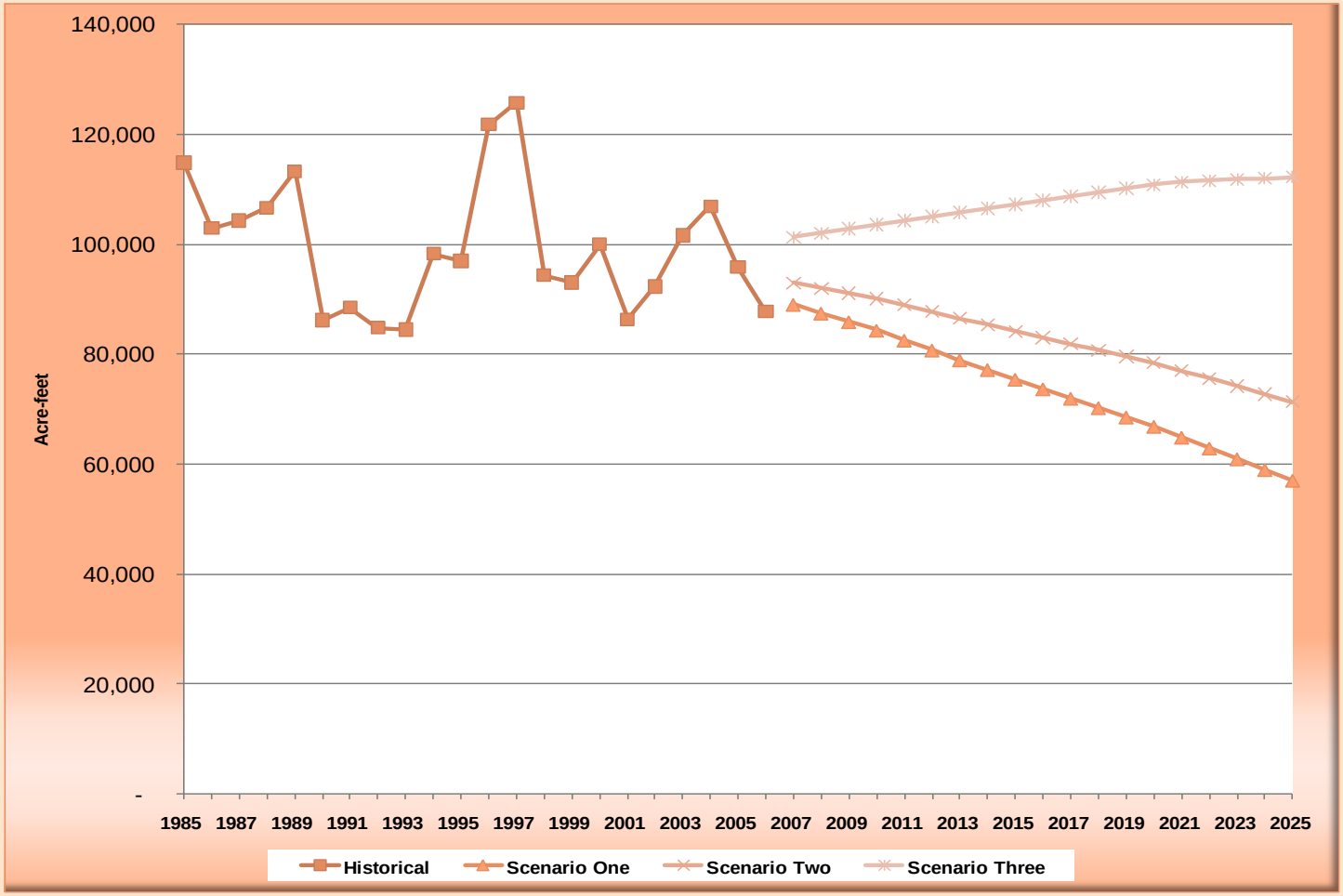


# Projected Industrial Supply

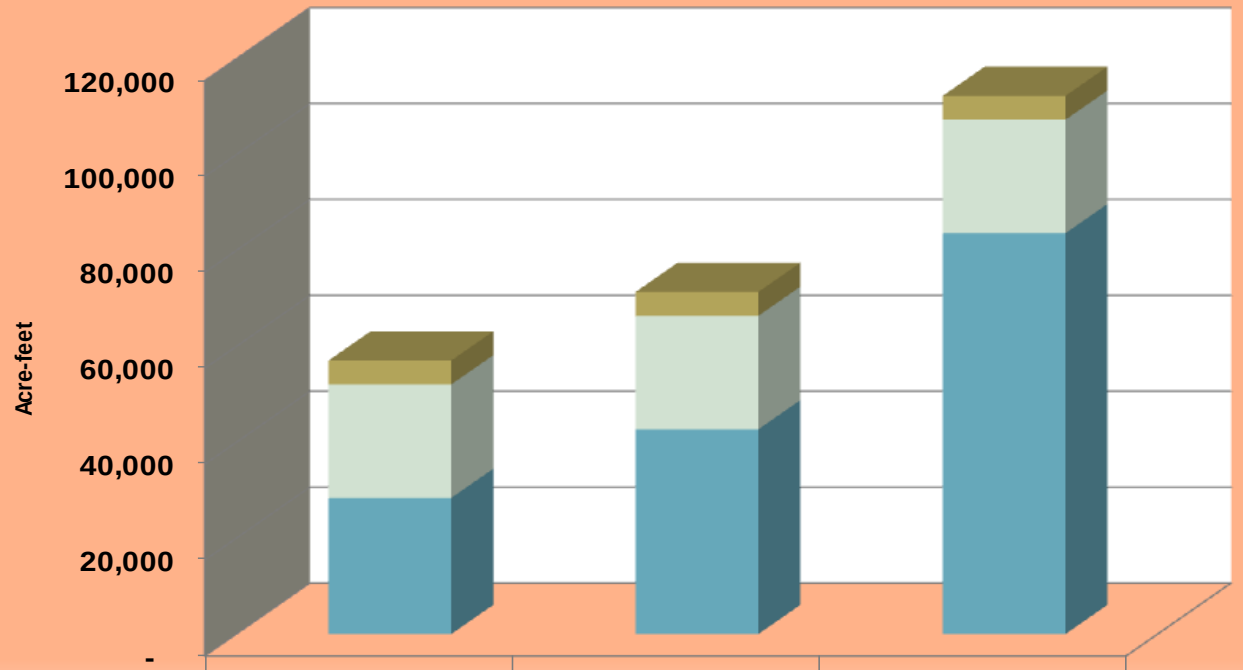



| | 2025 Scenario One | 2025 Scenario Two | 2025 Scenario Three |
|---|---|---|---|
| TOTAL | 55,682 | 63,782 | 71,282 |
| CAP | 335 | 335 | 335 |
| Surface Water | 400 | 400 | 400 |
| Reclaimed Water | 1,899 | 1,899 | 1,899 |
| In-Lieu CAP | 8,000 | 10,000 | 10,000 |
| Groundwater | 45,048 | 51,148 | 58,648 |

# Projected Agricultural Demand

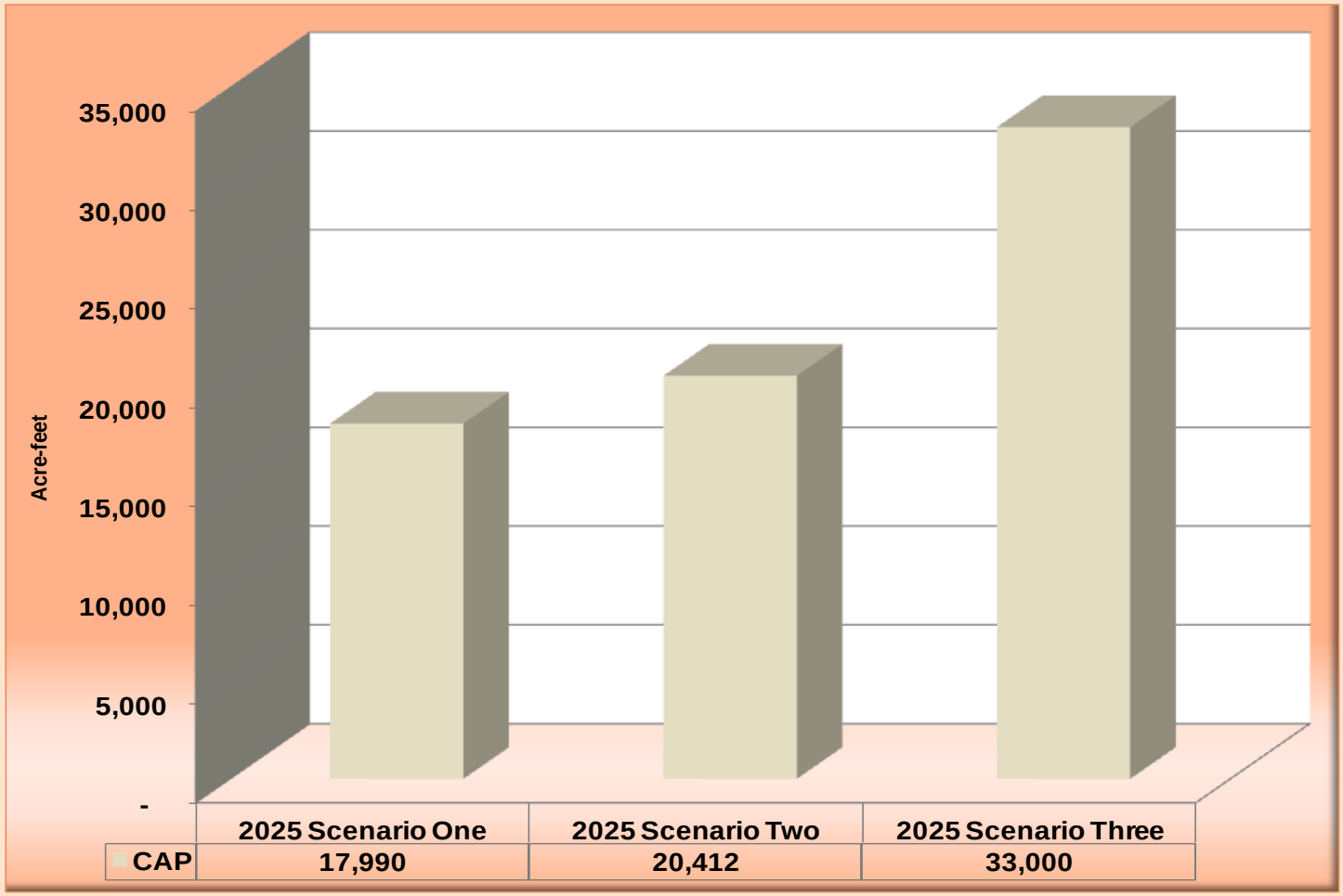


# Projected Agricultural Supply

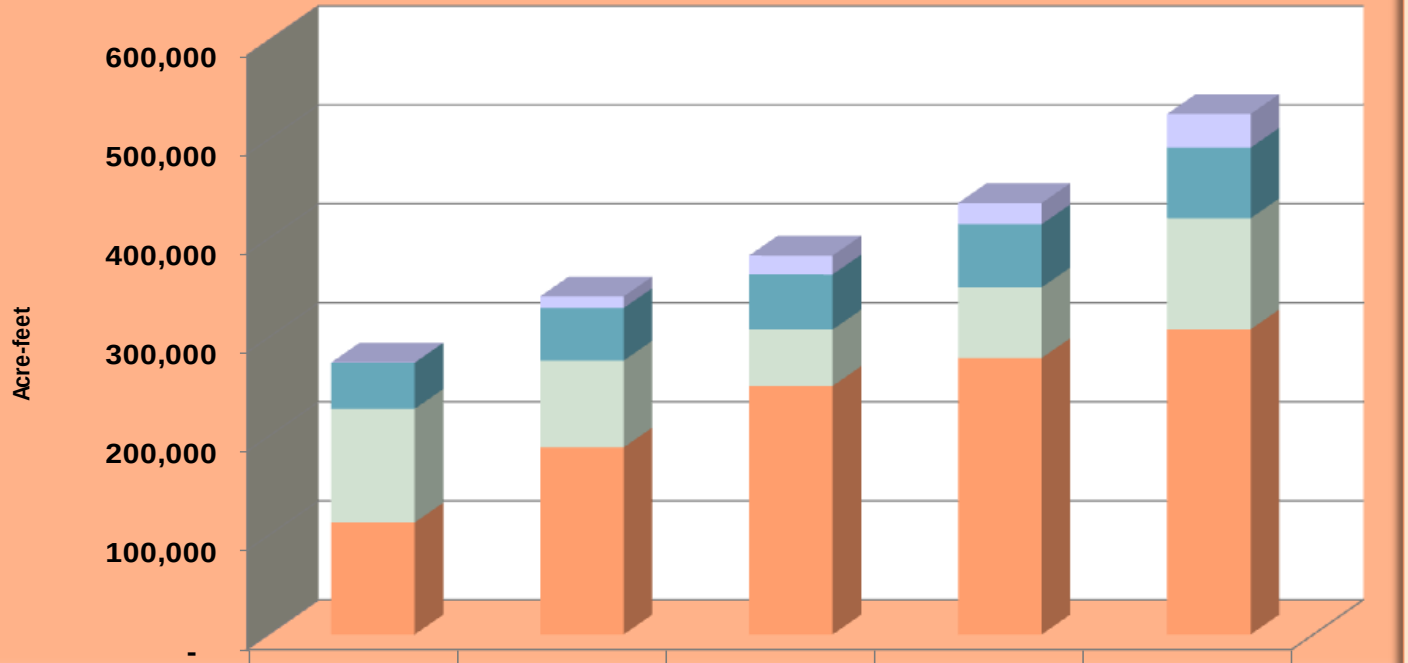



| | 2025 SCENARIO ONE | 2025 SCENARIO TWO | 2025 SCENARIO THREE |
|---|---|---|---|
| TOTAL | 57,038 | 71,342 | 112,245 |
| CAP (Direct Use) | 4,968 | 4,968 | 4,968 |
| In-Lieu Groundwater | 23,676 | 23,676 | 23,676 |
| Groundwater | 28,394 | 42,698 | 83,601 |

# Projected Indian Agriculture Demand and Supply

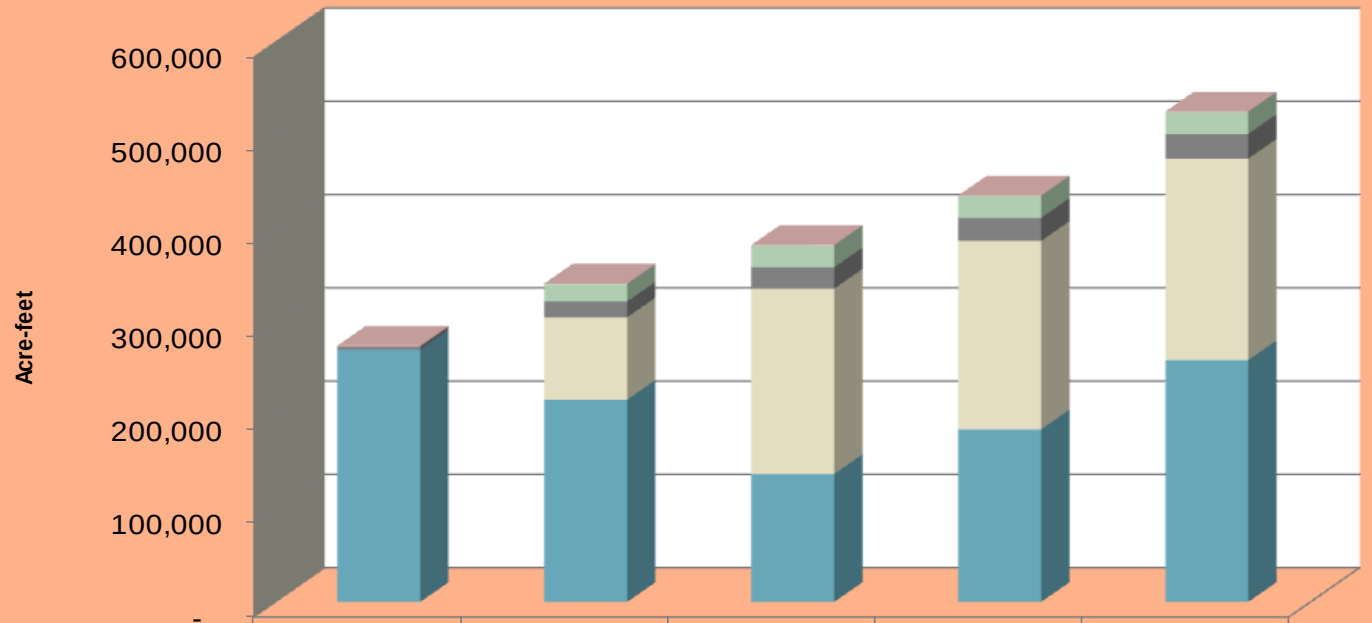


# Demand by Sector – Historical and Projected



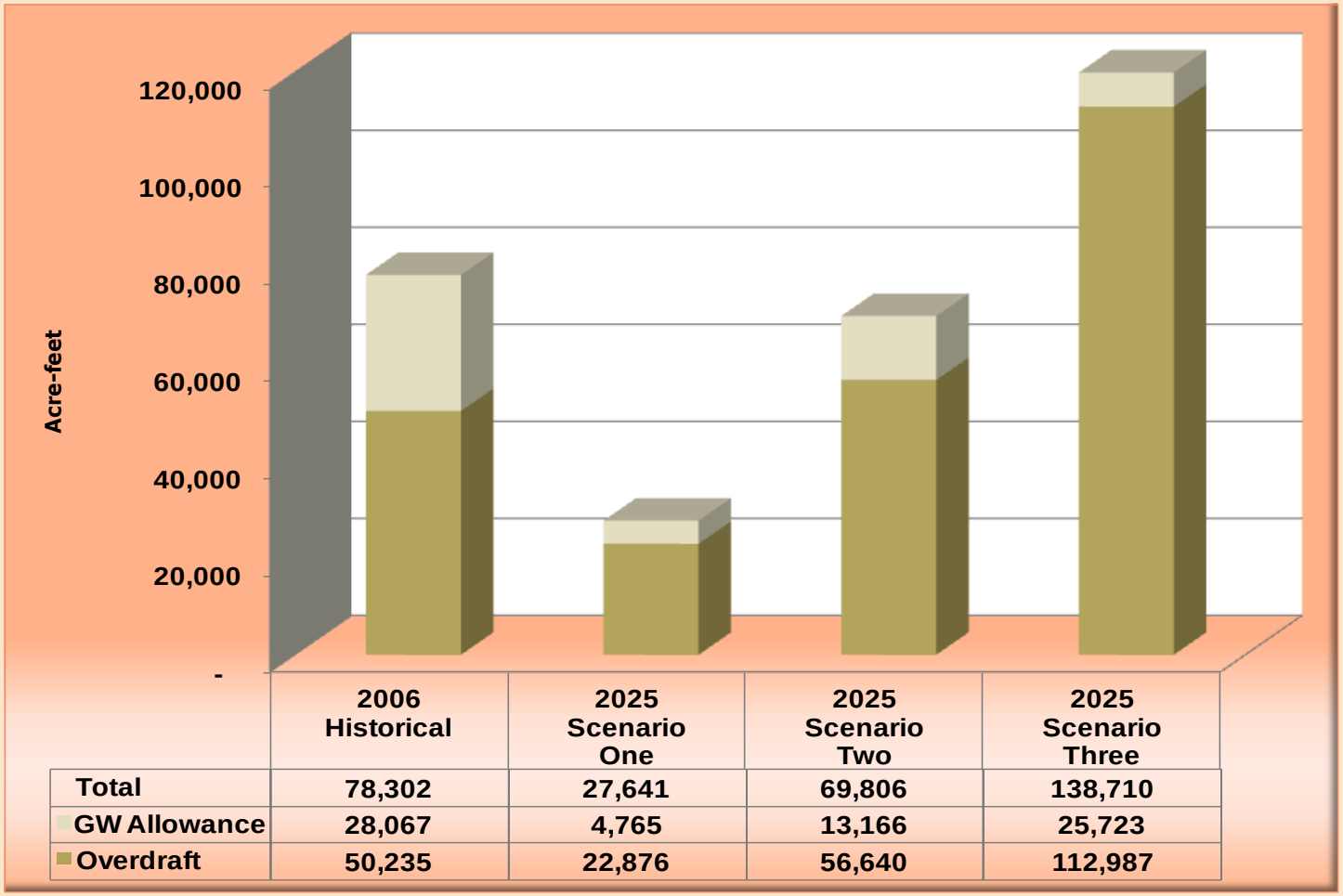

| | 1985 Historical | 2006 Historical | 2025 Scenario One | 2025 Scenario Two | 2025 Scenario Three |
|---|---|---|---|---|---|
| TOTAL | 274,735 | 341,484 | 382,771 | 435,843 | 525,807 |
| INDIAN | 160 | 11,678 | 19,033 | 21,455 | 34,043 |
| INDUSTRIAL | 46,616 | 53,084 | 55,682 | 63,782 | 71,282 |
| AGRICULTURAL | 114,879 | 87,755 | 57,038 | 71,342 | 112,245 |
| MUNICIPAL | 113,080 | 188,967 | 251,018 | 279,264 | 308,237 |

# Supply by Source – Historical and Projected




| | 1985 | 2006 | 2025 Scenario One | 2025 Scenario Two | 2025 Scenario Three |
|---|---|---|---|---|---|
| TOTAL | 274,735 | 341,484 | 382,771 | 435,843 | 525,807 |
| SURFACE | 720 | 610 | 400 | 400 | 400 |
| GSF | - | 18,794 | 23,676 | 23,676 | 23,676 |
| RECLAIMED | 3,546 | 16,830 | 22,801 | 24,623 | 26,453 |
| CAP | - | 88,399 | 198,782 | 202,136 | 216,024 |
| GROUNDWATER | 270,469 | 216,850 | 137,113 | 185,008 | 259,254 |

# Historical and Projected Overdraft




| | 2006 Historical | 2025 Scenario One | 2025 Scenario Two | 2025 Scenario Three |
|---|---|---|---|---|
| Total | 78,302 | 27,641 | 69,806 | 138,710 |
| GW Allowance | 28,067 | 4,765 | 13,166 | 25,723 |
| Overdraft | 50,235 | 22,876 | 56,640 | 112,987 |

# Additional Scenarios

- CAP Shortage Scenarios
  - Methodology
  - Shortage amounts
  - Overdraft, other implications
- Maximized Reclaimed Water Use Scenario

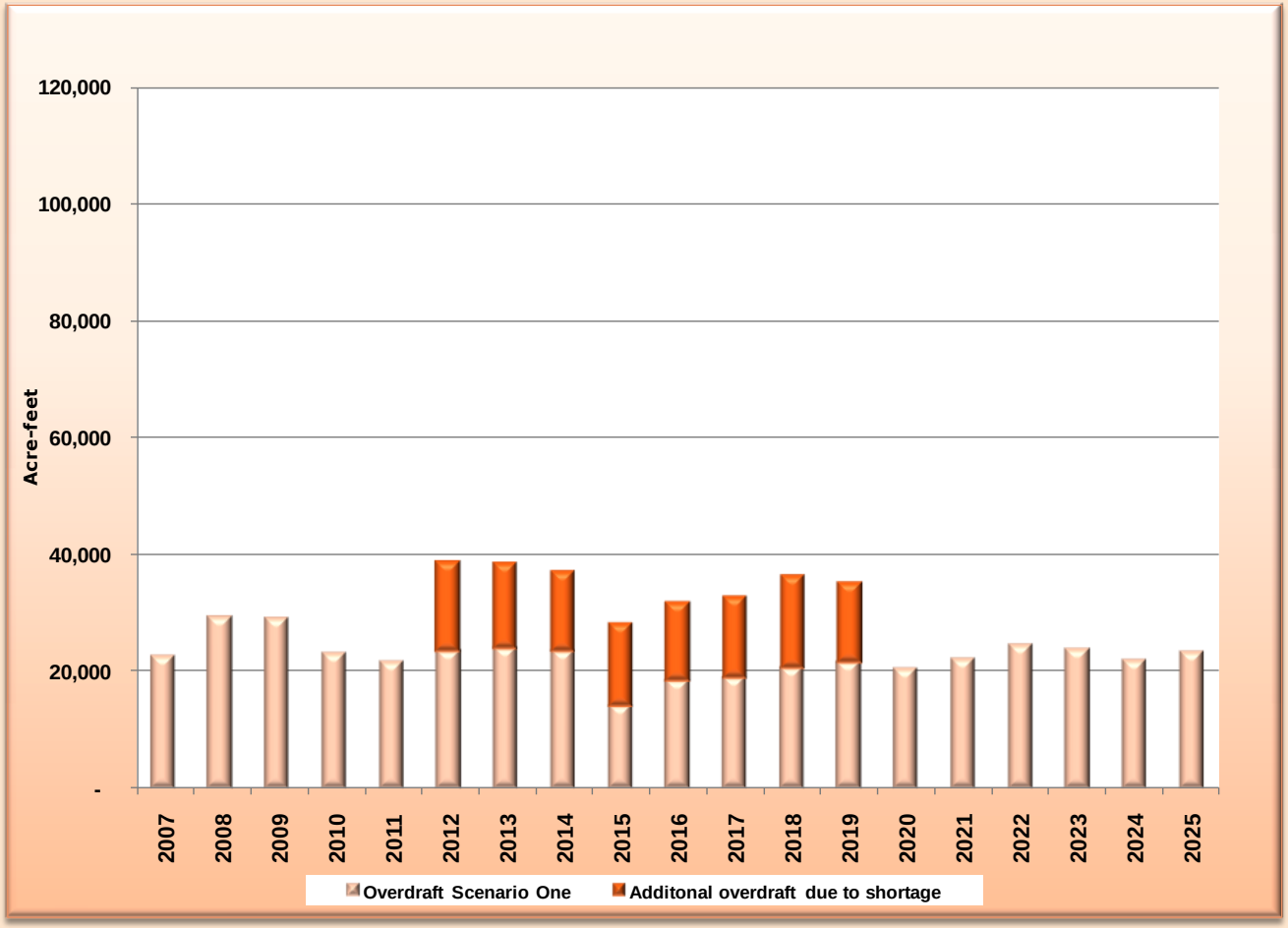
# CAP Shortage Scenarios

- Three additional scenarios incorporating reduced CAP supplies in recognition of potential climate change impacts
- Demand was not altered for any of the shortage projection scenarios
- ADWR Colorado River Management (CRM) staff generated the projected CAP shortage values, based on the 100-year record of Colorado River flow.

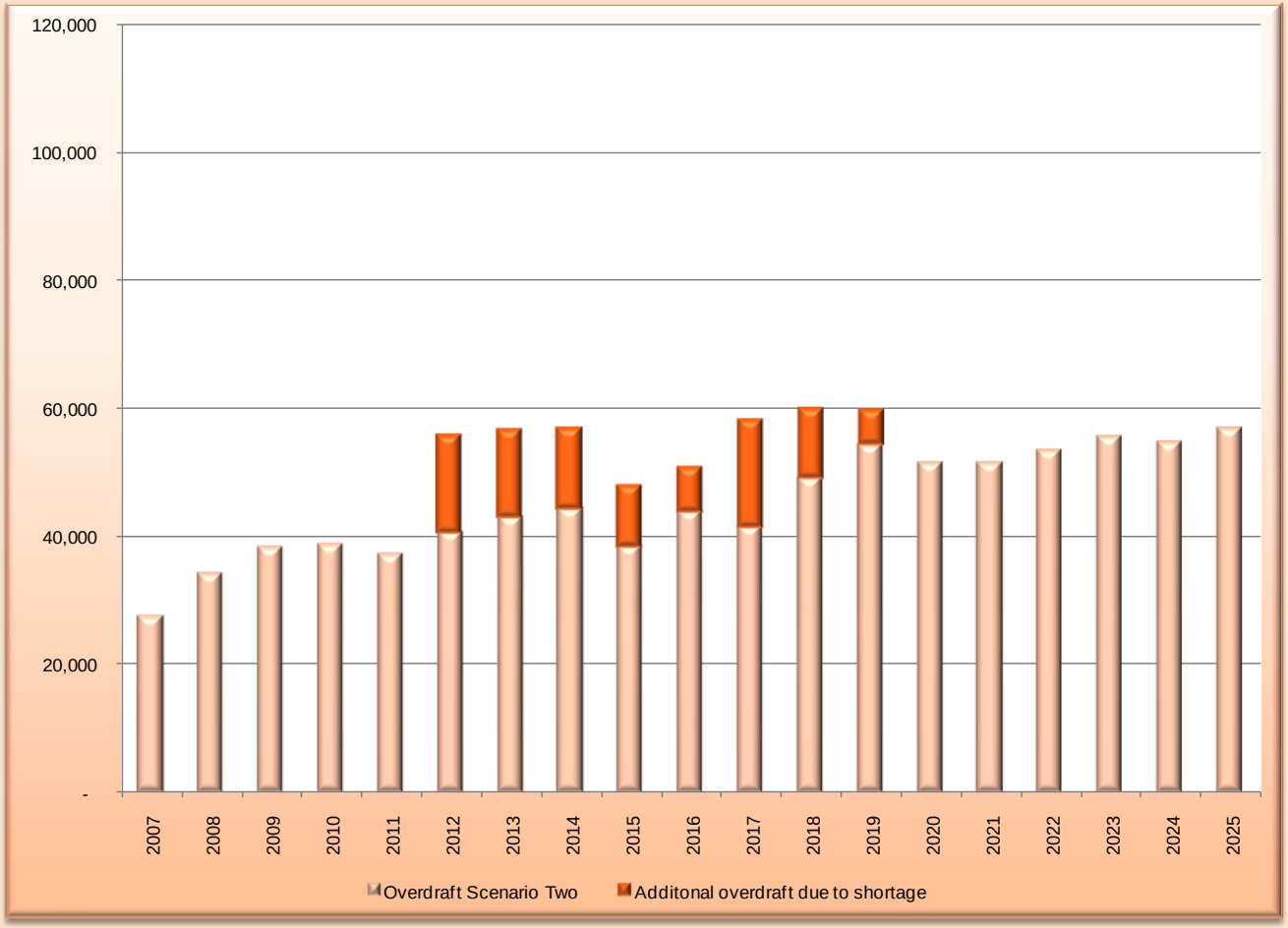
# CAP shortages chosen for scenarios, shortages to Arizona and the CAP

| Year | Projected CAP Availability | Shortage | Shortage Supply |
|---|---|---|---|
| 2009 | 1,433,223 | 0 | 1,433,223 |
| 2010 | 1,414,442 | 0 | 1,414,442 |
| 2011 | 1,412,872 | 0 | 1,412,872 |
| 2012 | 1,411,303 | 320,000 | 1,091,305 |
| 2013 | 1,409,733 | 400,000 | 1,009,733 |
| 2014 | 1,408,164 | 480,000 | 928,473 |
| 2015 | 1,406,594 | 400,000 | 1,006,596 |
| 2016 | 1,405,025 | 480,000 | 926,753 |
| 2017 | 1,403,455 | 400,000 | 1,003,457 |
| 2018 | 1,401,885 | 400,000 | 1,001,887 |
| 2019 | 1,400,550 | 400,000 | 1,000,553 |
| 2020 | 1,399,215 | 0 | 1,399,215 |
| 2021 | 1,397,902 | 0 | 1,397,902 |
| 2022 | 1,382,590 | 0 | 1,382,590 |
| 2023 | 1,381,277 | 0 | 1,381,277 |
| 2024 | 1,379,964 | 0 | 1,379,964 |
| 2025 | 1,378,651 | 0 | 1,378,651 |
| Sum of Shortage | 23,826,844 | 3,280,000 | 20,546,844 |

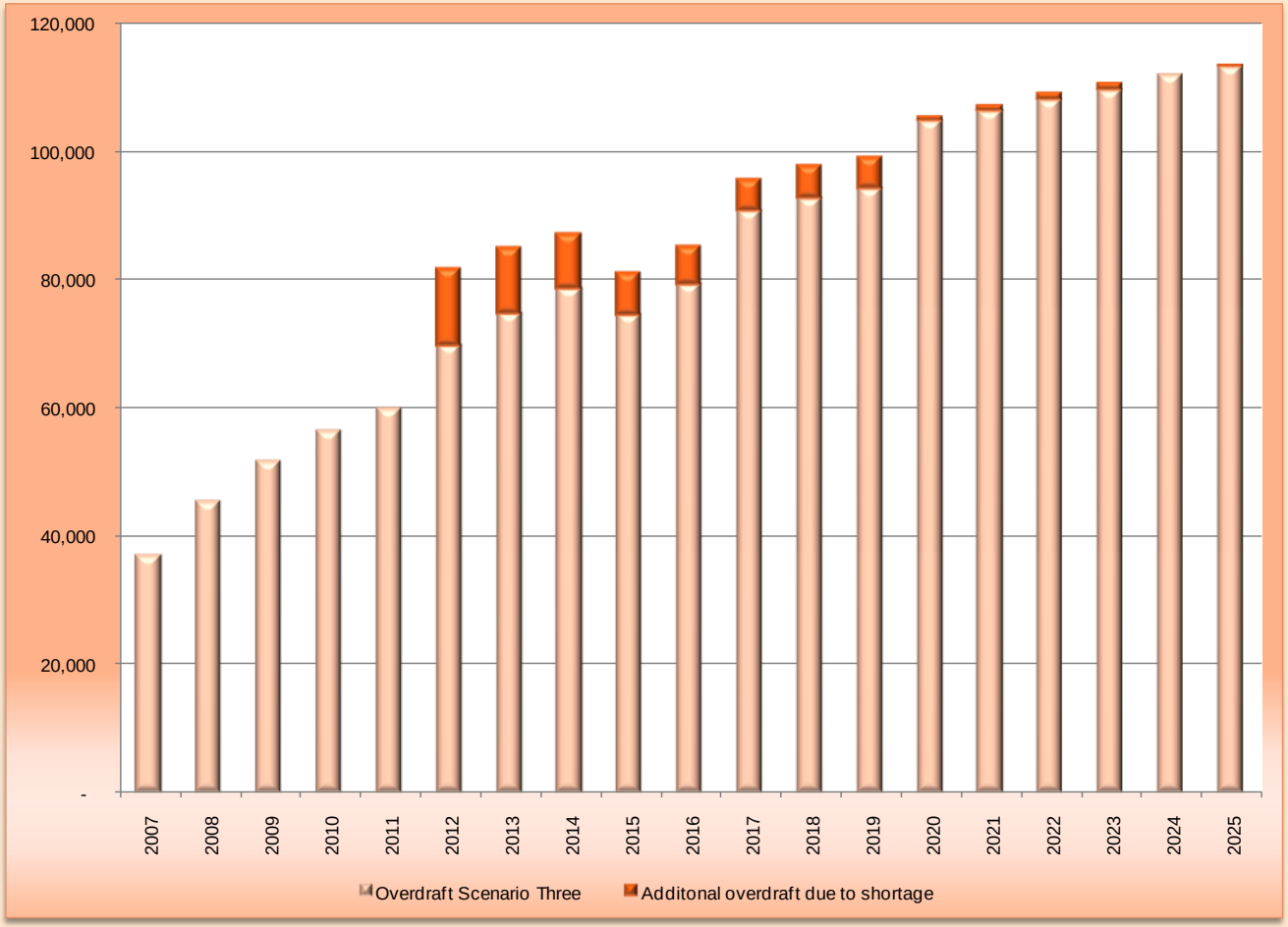
# *Shortage Scenario One Projected Annual Overdraft*
# With and Without CAP Shortage



# *Shortage Scenario Two Projected Annual Overdraft With and Without CAP Shortage*



# Shortage Scenario Three Projected Annual Overdraft With and Without CAP Shortage



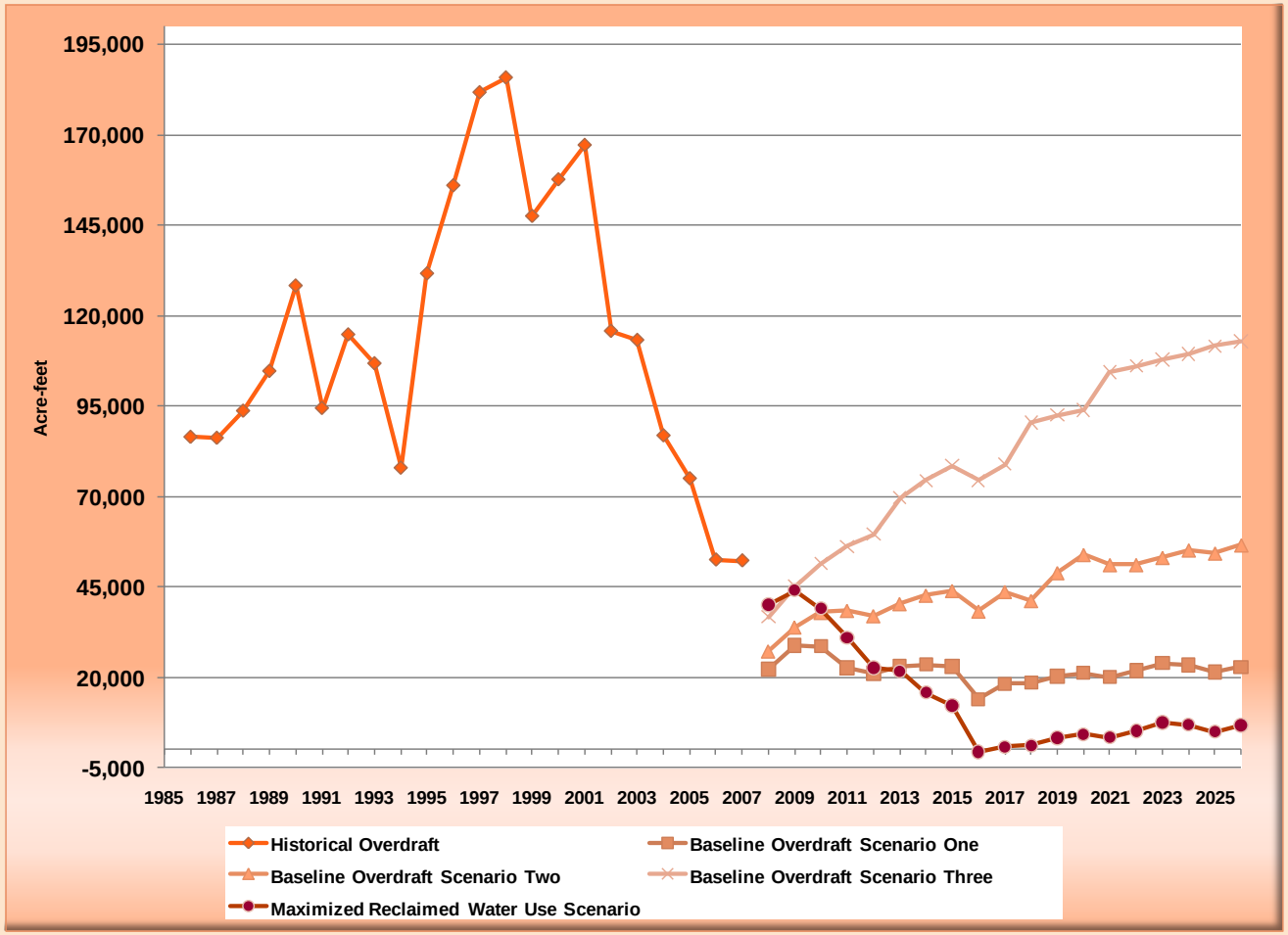
# Maximized Reclaimed Use Scenario

- Developed an alternative scenario that increased the projected annual reclaimed water use in the AMA.

- Specifically, this scenario was developed to analyze whether the goal of safe-yield could be achieved by maximizing annual reclaimed water use.

# *Projected* Overdraft – 2025

## *Maximized Reclaimed Water Scenario vs. Baseline Projection One*



# Results of the Maximized Reclaimed Water Scenario indicate:

- That the Tucson AMA could come very close to achieving safe-yield by 2025, assuming Baseline Scenario One projected demands and annual reclaimed water use is increased by all three sectors.

- Assumptions about where reclaimed water will be stored (managed vs. constructed facilities) also play an important role in these results.

Groups such as:

- The **City of Tucson and Pima County Water and Wastewater Study Oversight Committee** and

- The Governor's newly formed **Blue Ribbon Panel on Water Sustainability**,

…are beginning to address the need to increase reclaimed water use regionally as well as on a statewide basis.

# Next Steps

- TAMA Assessment is now online

www.azwater.gov Under “Hot Topics”

- Finalize other AMA Assessments, one a month is the goal

- Development of Fourth Management Plan (4MP)

# 4MP – What Should it look like?

- ADWR will approach the 4MP more as a Plan for success than a document that simply identifies the statutory requirements for the main water using sectors
- It will try to address:
  - The role of Conservation in getting to SY
  - Implications of NOT reaching SY
  - Consideration of different approaches in AMAs
  - Current limitations of Management Plans
  - Recognize sub-area issues within AMAs
  - Develop a long-term management strategy

# Questions